DOCUMENT RESUME

ED 113 552 CE 005 097

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TITLE Planning, Programming and Budgeting Systems (PPBS) and Cost Benefit Analysis (CBA): Economic Considerations for Adult Education. Occasional Paper No. 5.
INSTITUTION Pacific Association for Continuing Education, Burnaby (British Columbia).
PUB DATE Jul 75
NOTE 62p.

EDRS PRICE MF-$0.76 HC-$3.32 Plus Postage
DESCRIPTORS *Adult Education; *Cost Effectiveness; Decision Making; *Educational Economics; Evaluation Methods; Management Systems; *Program Administration; Program Budgeting; Program Planning; *Systems Approach
IDENTIFIERS *Planning Programming Budgeting System; PPBS

ABSTRACT

In adult education, program planning and administrative management are important areas within which economic analysis may contribute to effective and efficient decision making. The adult education administrator is faced with a dual economic task: (1) to prove beforehand that his programs will pay for the operating budget he is demanding; and (2) to make correct decisions both administratively and in the market-place to insure an efficiently operating organization and a continuous inflow of participants and funds. Two concepts are discussed to aid the adult educator at both the program planning stage and within his administrative functions: planning, programing and budgeting systems (PPBS) and cost benefit analysis (CBA). An overview of the demand for PPBS is presented as a rationale for its increasing acceptance, and a 10-step procedure is developed for generalized use in any educational institution. Within this 10-step procedure, CBA is introduced as one of the many possible program evaluation techniques to judge a program's worth. An example of CBA using a manpower training program is presented to allow the reader to understand the scope and limitations of the technique. A 36-item bibliography is included. (Author/EC)

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FOREWORD

Marvin Lamoureux has been an active member of PACE since 1972, the year he began attending the Adult Education Research Centre as a doctoral student and research assistant. Prior to his attendance at U.B.C. he was directly involved in adult education through his association with San Francisco State University, University of California (Berkeley) and the Alameda County School District PACE Centre (Programs For The Advancement of Creativity In Education). Since returning to B.C. he has been a business administration instructor at B.C.I.T. and a program evaluator for the Labour College of Canada in Montreal.

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CHAPTER I

THE CONCEPTUAL FRAMEWORK

INTRODUCTION

A day rarely passes in the working career of a professional adult educator when he is not confronted with an economic decision. At specific times his attention will focus on--among other things: the financing of an educational program; the expected student registration (consumer demand for his service); the equating of teacher supply with proposed programs; the expected financial returns from programs (total revenue); the determination of program output by other adult education institutions (the competitive structure); relating one's programs to the regional population (educational planning); promotion of the various program offerings; paying for one's operating budget through selected educational programming and administrative management techniques, and, if possible; showing a profit. These economic decisions are but a token representation of the economic reality faced by adult educators.

Within this economic reality adult education is defined as an institutional sub-sector. Over 2,000 books and articles have appeared reporting the research of scholars in this area.[1] The coverage has centered around twelve major themes, including:

"1. International and intranational studies of expenditures on education;
2. Financing education;
3. The demand for higher education;
4. Teacher supply and demand;
5. The production and distribution of education;
6. Efficiency in educational organizations;
7. Investment in education, investment criteria appropriate to education, and analysis of differential rates of return;
8. The role of education in the 'War on Poverty (U.S.)';
9. Education and economic growth;
10. Educational planning;
11. Educational obsolescence;
12. The competitive structure of education."[2]

The question then becomes: "Why has there been such a growing interest in applying economic methodology to education in general, and adult education in particular?" A twofold framework may be used to assess this question. In the first instance, the answer is found when one defines the term "economics" and an economic raison d'être.

Economics is defined as: "The study of how men and society choose, with or without the use of money, to employ scarce productive resources to produce various commodities or services over time and distribute them for consumption, now and in the future, among various people and groups in society".[3] In other words, economics is concerned with man's desire to satisfy as many wants as possible within a given stock of resources. The latter is composed of various forms of land, labour or capital. This satisfaction of desires is achieved by using the stock of available resources as efficiently as possible so as to derive the greatest possible benefit. "Economics does not prejudge society's desires. It is not a discipline concerned with morals. Rather it takes society's wishes as given and attempts to fill as many of these desires as possible with a minimum of resource input".[4]

The methodology of economics is therefore applied not only to its traditional areas of money, international trade, the business firm, etc., but also to the problems of determining efficient resource allocation attainment as related to education, regardless of the specific institution under consideration.

One must, however, determine if the reality of the situation is sufficiently demanding to use economic analysis. This is the second portion of the framework.

The demand for economic analysis is sufficient if any observable amount of resources is being spent on education programs. A need for economic analysis is further justified if the amount of resources (herein referred to as money) is great enough to demand a separate expense category within a governmental operating budget. As Table I below clearly indicates, Canada has come of age relative to expenditures on education.

Over $6.5 billion was spent on education during 1969-70, and this is expected to rise to over $9.3 billion by 1973-74.[6] As a portion of Canada's total national income, educational expenditures accounted for 10%. However, over 20% of all municipal, provincial and federal revenue went to education.[7] Some 60 federal government departments and agencies contribute to education in one way or another.

For adult education, over $800 million was allocated under the terms of the Technical and Vocational Act of 1961.[8] This act expired on March 31, 1967. The Federal Government now pays the full cost of vocational training of adults, including living allowances under the Adult Occupational Training Act of 1967. In the 1968-69 governmental fiscal year the expenditures amounted to $319,640,000. In

TABLE I

Sources of Funds and Total Expenditures on Education for Canada

Item	1969-70	1970-71	1971-72	1972-73	1973-74
Sources of funds					
Local government taxation	1,677.0	1,761.1	1,843.1	1,971.0	2,118.7
Provincial and territorial governments	3,572.3	4,223.8	4,679.2	5,190.7	5,540.3
Federal government	737.1	804.1	810.0	837.9	881.8
Non-government (private) sources	587.5	619.8	691.3	750.9	817.0
Sources of funds - Total	6,573.9	7,408.8	8,023.6	8,750.5	9,357.8
Expenditures on education					
Elementary and secondary education					
Public	4,163.1	4,681.2	5,053.5	5,415.0	5,719.7
Private	116.6	122.1	127.2	134.3	140.7
Elementary and secondary - Total	4,279.7	4,803.3	5,180.7	5,549.3	5,860.4
Post-secondary					
Non-university					
Teacher training outside of the universities	19.6	16.3	10.1	8.7	5.6
Community colleges and related institutions	216.3	293.9	359.3	431.8	507.8
"RN" diploma courses	49.0	63.3	66.7	69.1	72.7
University	1,556.4	1,754.3	1,926.1	2,100.9	2,306.8
Post-secondary - Total	1,841.3	2,127.8	2,362.2	2,610.5	2,892.9

(cont'd.)

TABLE I[5] (Continued)

Item	1969-70	1970-71	1971-72	1972-73	1973-74
Vocational training	431.1	455.9	459.3	569.4	583.1
Sub-total	6,552.1	7,387.0	8,002.2	8,729.2	9,336.4
Other	21.8	21.8	21.4	21.3	21.4
Expenditures - Total	6,573.9	7,408.8	8,023.6	8,750.5	9,357.8

the 1970-71 fiscal year the expenditures were over $406 million. The breakdown of this latter figure is seen in Table II below.

Table II[9]

Expenditures under the Adult Occupational Training Act 1970-71

Training Costs and Allowances	$213,690,000
Expenses under Old Agreements	3,000,000
Capital Projects (construction costs and equipment for vo-ed high schools)	105,950,000
University Research Projects	86,435,000
Total Federal Expenditures	$406,075,000

One must therefore concluded that economics, both as a general form of analytical evaluation and as an administrative decision-making tool, is sufficiently needed throughout the educational structure.

PURPOSE OF THE STUDY

Within the structure of adult education, program planning and administrative management are areas which have become recognized as important, not only for themselves, but as areas within which economic analysis may contribute to effective and efficient decision-making. Program planners, especially in the United States, and increasingly in

Canada, are being continually confronted by municipal, provincial and federal funding personnel who wish the economic costs and benefits of adult education programs determined in advance or at least considered as a part of a program's summative evaluation. The cost-benefit component of a program has, in many cases, become an equal partner to a program format's psychological-sociological-educational foundation.[10]

At the management or administrative level, adult education administrators have always had to compete within their own specific institutional framework for an operating budget. Because of its so-called marginality status, adult education's priorities have usually been subordinate to a school district's elementary and secondary needs. This has become even more accentuated in recent years due to the constraints placed on school district financing from the "taxpayer's revolt."

The analogous situation occurs at the provincial or post-secondary level when a university or college adult education administrator must present his budgetary needs within the shadow of academic or professional departments. At the federal level, manpower and training needs appear to be secondary when compared to other government portfolio demands--except in a crisis situation, as presently faced by the Canadian economy. Whether adult education is used merely as a stop-gap solution or considered within a framework of long-range planning still remains a moot point.

A second form of competition, although not directly budgetary, occurs for the adult education administrator. This competitive form relates to the potential market (students) for his educational programs (services). At the local level, school districts, especially those that border each other or are within each other's physical boundaries (university vs. community

college vs. a high school district vs. a community centre) must compete for overlapping and/or limited markets; overlapping in the geographical sense, and limited by virtue of the fact that less than 4% of the Canadian population attends adult education programs. (See Table III). Competition for this student market (geographical variations assumed) usually takes four classic marketing forms:

(1) program offerings by the adult education institutions;

(2) communication about available programs

(3) development of fee schedules

(4) location of offerings.

In summary, the adult education administrator is faced with a dual economic task:

(1) to prove beforehand that his programs will pay for the operating budget he is demanding, and

(2) to make correct decisions both administratively and in the market-place to insure an efficiently operating organization and a continuous inflow of participants and funds.

The purpose of this study will be to present two concepts: planning, programming and budgeting systems (PPBS) and cost-benefit analysis (CBA). Both should aid the adult educator at both the program planning stage and within his administrative function.

Table III[11]

Estimated Time Spent in Adult Education

Type of Education	Number of Hours						
	0 Hours	1 Hours	2 Hours	3 Hours	4-6 Hours	7-9 Hours	10+ Hours
Continuing education	95.4	0.3	0.4	0.5	0.9	0.5	2.0
Adult education	96.6	0.7	0.9	0.7	0.6	0.2	0.3
Performing and creative arts	97.8	0.6	0.4	0.3	0.5	0.1	0.3

SCOPE OF THE STUDY

Because this study has a dual purpose so too shall the study's scope. From the program planner's viewpoint the paper will focus on the relationship between cost-benefit analysis and its analytical framework--generally referred to as the planning-programming-budgeting system. Continuing, the paper will then present and explain the components and methodology of cost-benefit analysis (CBA); concluding with an operational example. The goal of the above exercise is to give the reader a conceptual and working overview of CBA as an economic and planning technique. This process should demonstrate the gap between ideally set criteria in an economic sense and what actually occurs when the technique is employed within an institutional setting. From this presentation the adult educator should be better prepared to critically evaluate literature, expectations and demands by CBA proponents.

The adult education administrator should be as concerned as the program planner with the above presentation since the administrator's institutional viability depends on new-program development as well as a program's defensibility relative to other educational and non-educational budgetary needs. He will also be interested in how efficiently his organization is functioning. Since resources and markets are limited, the more efficient his organization, the more program flexibility he would be able to attain; and, hopefully, the adult education administrator would be in a good position to demand greater operating funds, or at least be given the opportunity to take programming risks.

FOOTNOTES

1. D.C. Rogers and H.S. Ruchlin, Economics and Education Principles and Practices (The Free Press; N.Y.: 1971), p.1.

2. Ibid., p.2.

3. P.A. Samuelson and A. Scott, Economics An Introductory Analysis (McGraw-Hill; Toronto: 1966), p.5.

4. Rogers and Ruchlin, op. cit., p.5.

5. Annual Report, 1970-71, Manpower and Immigration, Cat. No. MP1-1971 (Information Canada; Ottawa: 1971), p.46.

6. "National Income...net national income at factor cost measures the current earnings of Canadian factors of production (i.e., land, labour, capital) from productive activity. It includes wages and salaries, profits, interest, net rent and net income of farm and non-farm unincorporated business," in Canada Year Book 1970-71 (Statistics Canada; Ottawa: 1971), p.1175.

7. Ibid., p.424.

8. Annual Report, op. cit., p.8.

9. Ibid., p. 425.

10. G.G. Somers and W.D. Wood, editors, Cost-Benefit Analysis of Manpower Policies (Hanson & Edgar; Kingston, Ont.: 1969), p. v - xvi.

11. J.E. Wicks, Chief Cultural Information Section, Education Division, Statistics Canada, Ottawa, Ontario in a letter to Dr. Gary Dickinson, Assistant Professor of Education, Univ. of B.C., Adult Education Research Center, Vancouver, B.C., Nov. 23, 1972.

CHAPTER II

ACCOUNTABILITY AND THE PLANNING, PROGRAMMING, BUDGETING SYSTEM IN ADULT EDUCATION

INTRODUCTION

A review of literature pertaining to planning-programming-budgeting system (PPBS) generally leads one into a mild state of confusion. On the one hand an author will present the "fundamentals" of PPBS along with one or more illuminating examples but give little institutional or historical framework related to the technique's usefulness. On the other hand another author will attempt to give some institutional or historical perspective but become too involved with economic jargon as defined by the cost-benefit components of PPBS.

In an attempt to overcome the above problems this chapter will develop the concept of accountability as a general rationale for the use of a PPBS in adult education institutions. PPBS will be further explored within this adult education context, and once this decision-making framework is established, the paper, in Chapter III, will focus on one of the key evaluative techniques of PPBS, that of cost-benefit analysis (CBA).

ACCOUNTABILITY - A DEFINITION

Accountability has come to mean that someone or some unit within a particular organization should be held responsible for the attainment

of specific objectives as just return for an investment of time, energy and money.[1] Thus, accountability may be considered as a process designed to ensure that any individual can determine for himself if the particular educational institution is producing the promised results.[2]

HISTORICAL BACKGROUND

The use of some form of accountability in various sectors of public and educational administration, including adult education, is not new. Administrators have always developed operating budgets which presented a line-by-line expenditure pattern, that is, expense and revenue categories such as "books", "maintenance", "tuition fees", etc., with a dollar amount after each of the separate categories. These expense or revenue categories were aggregative in nature and only showed how much per category was spent or received. Little demand was made to develop expenditure or revenue reports related to specific programs or program activities; and, even less demand was made for reports linking program costs with program benefits. However, there is now a drive toward the adoption of accountability within a management systems approach for decision-making and expenditure allocation both in the public and educational administrative structures. This management system approach is referred to as a Planning, Programming, Budgeting System or PPBS.

In its 1949 report, "Organization of the Executive Branch of Government", the Hoover Commission in the United States recommended that the government adopt a budget based on functions, activities and objectives, which it designated a "performance budget".[3] Approximately five years later,

financial and economic researchers at the Rand Corporation (California) developed what is known as "program budgeting" for the United States Air Force. By 1961 this budgeting format was adopted throughout the United States Department of Defense, and in 1965, former President Johnson announced the establishment of a PPBS to be used by all civilian agencies of the federal government. Since this also included the Department of Health, Education and Welfare, this department naturally demanded the same type of fiscal and programming response from state and local educational institutions. This latter framework therefore caused PPBS to spread quickly throughout all levels of educational administration and adult education.[4]

The current interest and activity in Canada relative to the introduction of PPBS at the federal level stems from the Glassco Commission reports published in 1962. The Commission recommended that the annual expenditure estimates be prepared on the basis of programs and activities rather than standard objects of expenditures (line-by-line expenditures) and that future year requirements be determined on the basis of targets of accomplishment rather than merely a continued projection of past operations.[5]

In May of 1968 the Minister of Finance announced that the Government of Canada would adopt the PPBS. According to the minister, the system will provide government management with: "(1) clearly defined goals; (2) adequate means to determine the best mix of resources to be used to achieve these goals; (3) a meaningful way to measure and report how well goals are being met, and how efficiently resources are being used".[6]

Presently, there appears to be more talk than action at the federal, provincial and local public and educational administrative levels in Canadian government. The pressure, however, appears to be building for the

adoption of a PPBS decision-making procedure to aid in the allocation of the scarce resources.[7]

ADMINISTRATIVE SYSTEMS

Generally, one considers accountability as a principle of administration, that is, a fundamental characteristic of good management. Systems analysis is, on the other hand, a technique that can be used by an administrator to sharpen his judgements in order to make accountability more meaningful; not only to himself but to other interested parties. More specifically, systems analysis may be viewed as a search for an evaluation of alternatives which are relevant to defined objectives, in order that such evaluations can be presented to decision-makers for their consideration.[8]

Within the general framework of systems analysis one specific method has been identified as applicable and useful for most forms of public or educational administration, and program planning. The latter method is called PPBS. Planning is defined as the selection or identification of the overall, long-range objectives of the institution and the systematic analysis of various courses of action in terms of relative costs and benefits. Programming is defined as deciding on the specific courses of action to be followed in carrying out planning decisions. Budgeting is defined as translating planning and programming decisions into specific financial plans.[9]

In theory PPBS seeks to develop the data base and the underlying structural relationships needed to marginally allocate scarce resources to competing end users. The ultimate goal is to make decisions in terms of the

impact that additional dollars might make on the solution of problems faced by institutions in the public sector of the economy. If there are diminishing returns to investment in the various planning areas, presumably there is some unique pattern of tax or other resource allocation which will optimize benefits for all concerned.[10]

In reality however, PPBS involves selecting long-range objectives; decisions on specific courses of action to be followed; and translation of planning and programming decisions into specific financial plans for relatively short periods of time. To accomplish its objectives, PPBS requires orderly procedures for handling multi-year inputs (costs) and outputs (benefits). Its usefulness depends, in part, upon the existence of an analytical capability for systematically examining the resource implications of programs and for selecting the least-cost means of achieving program objectives.[11]

DEMAND FACTORS FOR PPBS ADOPTION

The reasons that have been presented for the adoption of PPBS within adult education and other public institutions are varied:[12]

(1) There is increased competition with other social and educational programs for limited funds. Therefore the public and their representatives would look more favourably on the adult educator's needs if he explained how and why he spent (or will be spending) their money, and what he hopes to achieve at the activity level;

(2) PPBS adoption is slated for the near future in federal and

provincial agencies. In order to acquire funds adult educators will have to conform to the latter's fiscal and programming demands;

(3) Because funds are less plentiful, there is a growing interest in increasing program effectiveness, that is, the search for the best way to spend resources and to realize the greatest benefits;

(4) The mechanics of governance in continuing education institutions and other adult education oriented institutions are receiving greater attention by all those who wish to increase their participation in directing the future of these institutions. PPBS may insure that this participation can be accommodated on an orderly basis. This is a format which enhances a more rational approach to resource allocation by providing greater visibility for the increased number of persons who will participate in all phases of the decision-making process;

(5) When there are considerably more projects or programs seeking support than funds to support them, institutional priorities must be very carefully established. With a knowledge of what each program seeks to accomplish, and what resources each requires, there is a more rational basis for establishing priorities;

(6) It is hoped that PPBS will provide a "handle" by which one may grasp the essence of increasingly complex institutions and units within the institutions;

(7) A budget is traditionally viewed as direction to the institution for discharging a responsibility--an accounting of funds spent. But such line-by-line item budgets provide little substance for a useful dialogue on the issues of adult education and the latter's activities. For example, most budgeting systems in educational institutions which have a adult education department are based on the requests for resources from the

department heads. Classical budgeting techniques make no attempt to assess the contribution of each departmental activity towards organizational objectives. If one sums this problem over all departments throughout an institution then one must realize that the head of such an institution has little basis on which to evaluate the requests from all the departments (or faculties). Such a situation generally results in a forced delegation of the administrator's authority with regard to resource allocation among departments. Therefore, each department tends to develop autonomously with respect to the other departments and to the overall objectives of the institution. The power and the prestige of the department heads become dominating factors in the competition for scarce resources. The scarce resources of course may not only be funds, but include office space, class space, equipment, secretarial help, etc.

(8) The existing techniques of long-range planning currently in use throughout public systems of adult education are of negligible value for evaluating alternative programs, and do not even question the suitability of the existing system.

(9) The present system of planning, programming and budgeting in adult education institutions hinders the development of a vast number of programs because the system is not adequately geared to handle program development, effectiveness measurement and therefore accountability.

PPBS - A PARADIGM

One institution may vary from another concerning the implementation of PPBS and accountability; however, the following ten steps summarize a normal procedure to follow under most circumstances:[13]

(1) The objectives of the institution must be identified and goals established which would satisfy these objectives.

(2) All of the programs which might reasonably accomplish these goals are developed. This accommodates and encourages all of the innovation an institution might be seeking.

(3) The costs, or resource requirements---money, people, facilities, operational needs, etc.---for each of the alternative programs are assigned.

(4) The benefits or goal-satisfying potential of each of the alternative programs are identified. This is a dimension required by PPBS and also one of the most difficult to accomplish. It is intrinsic to developing priorities.

(5) To quantifiable costs and benefits, the decision-maker must add his own assessment of the difficult or impossible to quantify--quality, potential, political expediency, etc.--and select those alternatives which appear to best satisfy the objectives and the goals of the institution.

(6) The long-range fiscal implications of those decisions are tested by projecting their impact over the next five to ten years.

(7) The annual budget is developed from the data for the current year of the long-range fiscal projections.

(8) The program alternatives which were selected, budgeted and

implemented are evaluated to see if the anticipated benefits were actually realized.

(9) The costs of the selected alternatives are reviewed to develop new standards to be used in assigning resource requirements to new program proposals and other alternatives.

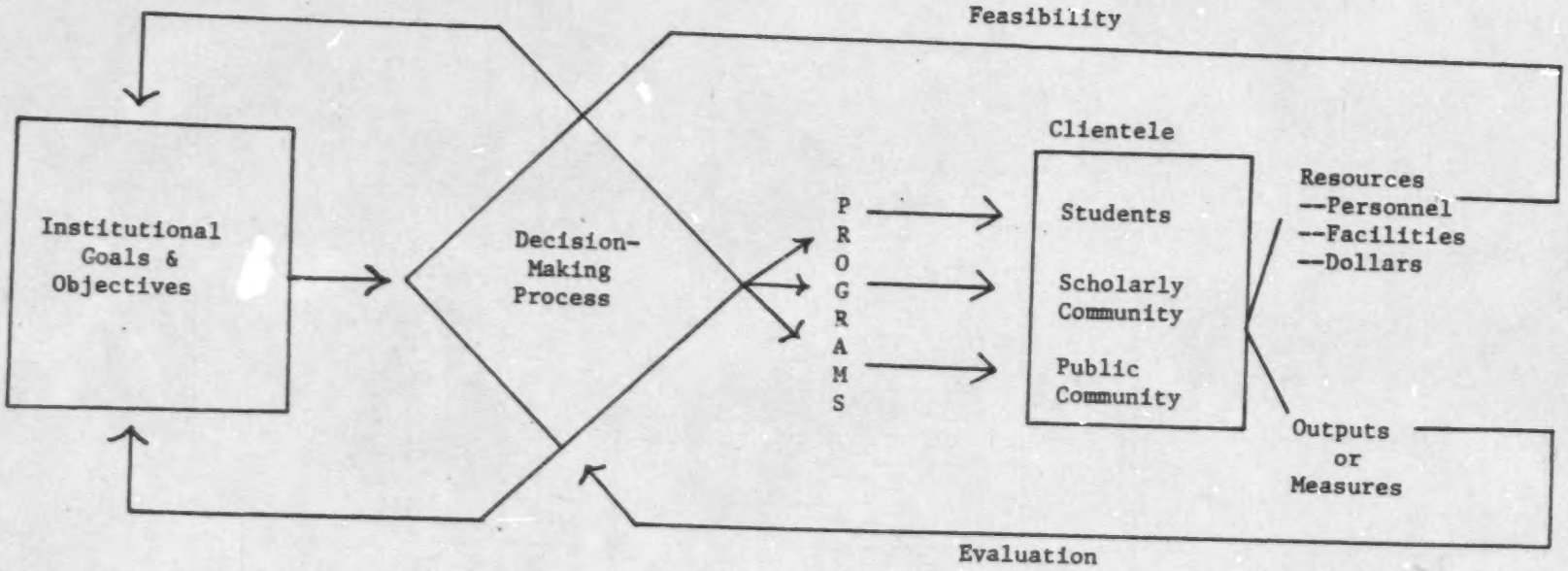
(10) The cycle is repeated on a continuous basis to allow for changes in objectives and goals, for program innovations, for changes in available resources, and for changes in the environment in which the institution operates.

SUMMARY

The overview of accountability and PPBS was developed to give the following discussion of cost-benefit analysis (Chapter III) a decision framework. Unlike most studies concerning CBA, the subject will not be presented as if it were a unique administrative technique for evaluating or developing adult education programs. Rather, one should realize its subordination to a higher form of administrative management. To be precise, CBA has its place only in the third through sixth steps of the previously discussed PPBS "Paradigm". The CBA technique is not an end in itself, but merely a practical and beneficial characteristic of a total management system. For a diagrammatic presentation of this subject please refer to Figures I and II below.

Figure I

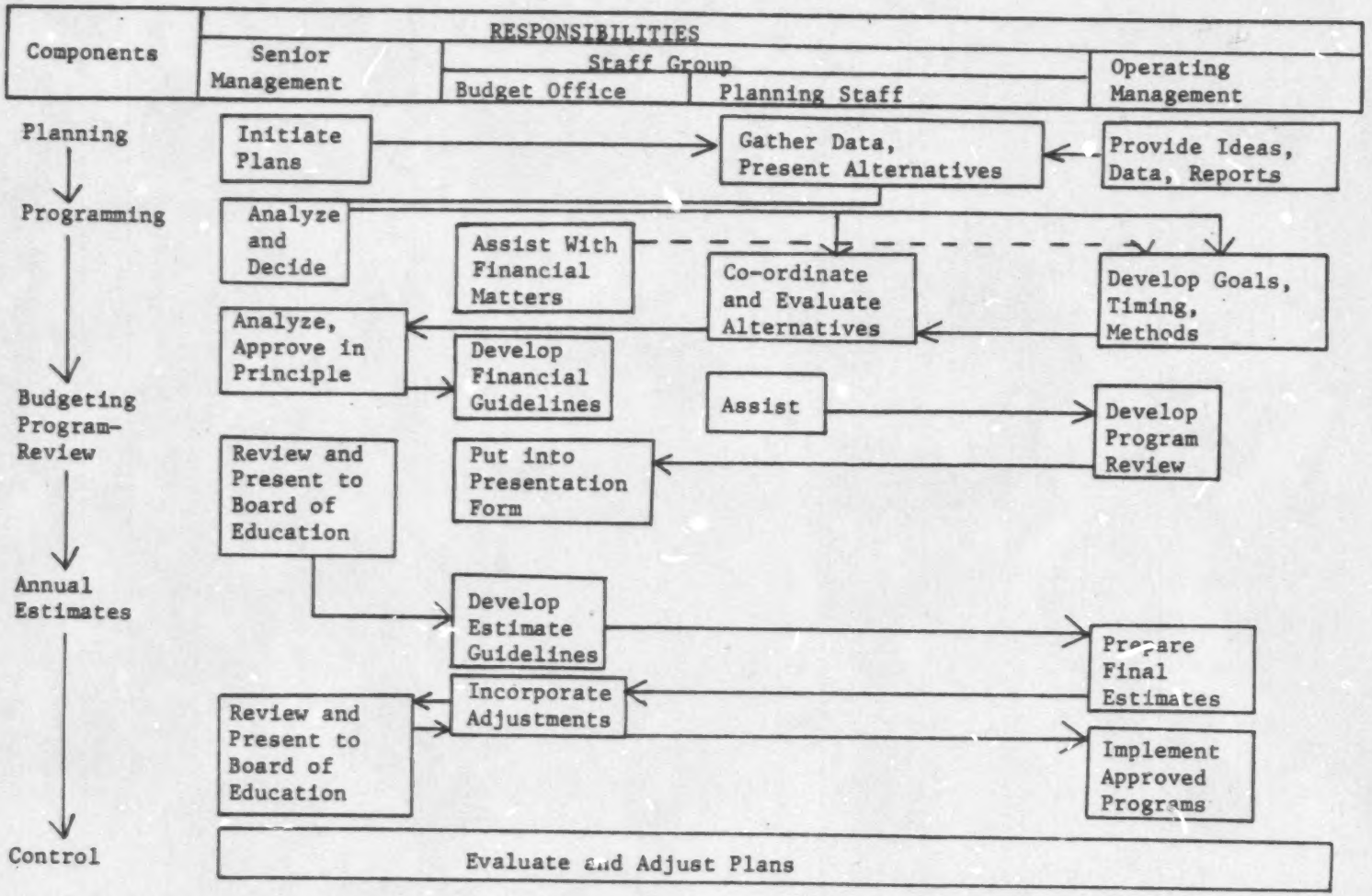
A Conceptual Framework for the PPBS -- Accountability in a Higher Education Institution



*From: Gulko, W.W. and K.M. Hussain, A Resource Requirements Prediction Model (RRPM-1) -- An Introduction to the Model (National Center for Higher Education Management, Boulder, Colo.: October, 1971,) p. 4.

Figure II

A Functional Framework for the PPBS - Accountability for a Generalized Educational System



* From: Brandwood, Colin, A Program Budget Model For Selected School Programs In The Province Of Ontario, unpublished M.B.A. Thesis, (University of British Columbia, Vancouver, B.C.: March, 1969), p. 37.

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1. D.M. Nordh, "Emphasis: Accountability and the Community College," Junior College Journal, Vol. 41, No. 6, March, 1971, p. 3.

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3. L.R. Morrell, "A Look At Program Budgeting," Educational Record, Summer, 1969, Vol. 50, No. 3, pp. 286-289.

4. See: E.D. Etherington and R.F. Vancil, Systems and Simulations: New Technology Goes to Work on Decision-Making," College and University Business, Vol. 46, No. 3, March, 1969, pp. 55-62; R.E. Lahti, "Management By Objectives," College and University Business, July, 1971, pp. 31-33; S.M. Steele, Cost-Benefit Analysis And The Adult Educator -- A Literature Review (ERIC Clearinghouse on Adult Education, Syracuse, N.Y.: July, 1971), 28 pp.

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8. Planning-Programming-Budgeting Systems Analysis Glossary (United States General Accounting Office; Washington, D.C.: January, 1968), p. 6.

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10. Steele, op. cit.; and D.L. Thompson, "PPBS: The Need for Experience," The Journal of Higher Education, Vol. 42, No. 8, November, 1971, pp. 687-691.

11. Planning-Programming-Budgeting and Systems Analysis Glossary, op. cit.

12. See: J.S. Dyer, The Use of PPBS in a Public System of Higher Education: Is It 'Cost-Effective'? unpublished working paper

Footnotes

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13. See: C. Brandwood, A Program Budget Model For Selected School Programs in the Province of Ontario, unpublished M.B.A. Thesis (University of B.C.; Vancouver, B.C.: March, 1969), 132 pp.; Education Newsletter, Kates, Peat, Marwick & Co., Vancouver, B.C. June, 1972), 24 pp.; W.W. Gulko and K.M. Hussain, A Resource Requirements Prediction Model (RRPM-1)-- An Introduction to the Model (National Center for Higher Education Management; Boulder, Colo.: October, 1971,)39 pp.

CHAPTER III

COST-BENEFIT ANALYSIS IN ADULT EDUCATION

INTRODUCTION

Economists have developed Cost-Benefit Analysis (CBA) to deal with problems related to the comparison and evaluation of alternative educational programs which achieve specific objectives. CBA draws its theoretical basis from welfare economics, public finance and resource economics.[1] This body of work, especially welfare economics, tries to establish conditions for the optimal allocation of resources. In other words, to choose an alternative means to achieve an objective whereby no other alternative, other than the one chosen, can achieve higher benefits over costs. Because of its roots, CBA has traditionally emphasized economic efficiency as the main criteria for judging and ranking project proposals. The best project is the one that makes the largest net contribution to National Product.

The discussion of CBA that will follow assumes application for a decision-maker who is trying to achieve the best possible allocation of a fixed budget. Attention will not be given to the larger question of how the budget constraint was established. This latter problem is related to the use of CBA at the higher levels of an educational hierarchy such as the school district administrative offices or the financial committee of a university. Under these circumstances the decision-makers could and should use CBA as a deterministic component, however other components such as

tradition, inter-related personal motives, "politics" of the situation, etc. may be the prime decision factors.

The above leads us into two principal limitations (as distinct from practice) of CBA:[2]

(1) CBA as generally understood is only a technique for making decisions within a framework which has to be decided upon in advance and which involves a wide range of non-economic considerations, many of them a political or social character;[3]

(2) Cost-benefit techniques as so far developed are least relevant to and serviceable for what one might call large-size institutional decisions, especially in developing nations where an investment project such as a multi-university system, multi-vocational system, railroad, etc. may affect the total population both immediately and in the future. It should also be noted that the same basic problem or limitation occurs when operating budgets are determined for federal government portfolios in developed nations. In both of the above limitations measurement of costs and benefits becomes very difficult and costly.

In summary we are concerned with the decision-maker who controls an adult education institution such as a high school district adult education night system, a manpower training center, a continuing education department in a post-secondary institution, etc. who has defined objectives for his institution, and who now must decide which alternative programs he may conduct that would be most efficient in an economic sense (given pre-accepted constraints).

STATEMENT OF THE COST-BENEFIT ANALYSIS PROBLEM

"The aim is to maximize the present value of all benefits less that of all costs, subject to specified constraints."[4] Although this statement is very general it does enable one to set out a series of questions, the answers to which constitute a general explanation of CBA as it is related to adult education.

(1) Which costs and which benefits are to be included?

The program planner or research analyst is posed with a group of rather critical questions at this point. He must decide: (i) which costs and benefits are directly related to the specific program, the program's activities and the program participants; (ii) which costs and benefits are considered externalities, that is, those costs and benefits which accrue to institutions, people or society in general, but are considered apart from whoever is sponsoring or participating in the project; (iii) what data is available or could be obtained for a reasonable cost to determine answers for questions (i) and (ii), and; (iv) what course of presentation is both politically feasible and institutionally most favourable. In other words, what costs and benefits can one not only claim but defend.

In theory one would prefer to present the complete costs and benefits of an educational program, including the externalities. This, however, is somewhat difficult to accomplish, due to the lack of available data. Secondly, the components of the benefits and costs could be difficult to

defend in a theoretical sense. To give an example of this very problem Table IV, Components of a Benefit-Cost Calculation of a Manpower Training Program (Benefits) and Table V, Components of a Benefit-Cost Calculation of a Manpower Training Program (Costs)[5] define the various potential cost and benefit factors.

The benefit to any individual from an adult education program such as a manpower training program consists of the net gain in income for some specific time period. The net gain in income meaning the difference between income received by the actual group which took the course (experimental) and those who did not participate (control). The income benefit component is usually determined by regional or national average figures for the positions that the participants acquire. Certain other fringe benefits due to the type of job may also be considered as an addition to one's income. The individual may become a salesman and be given a company car to use for business and pleasure, or he may work for a department store and get 10% off on all purchases. These are benefits which increase one's real income since they automatically increase the individual's purchasing power. If a program planner attempts to use the government or society benefits as presented in Table IV the problem of adequate data and defense of specific components is obvious. Where the program planner or adult education administrator can use the components based on a review of related literature or programs in defense of his program he should do so. This does not mean he must present figures, but he does present the fact that a program usually has effects external to the participant and the sponsoring agency.

The cost data to be considered is usually made available through

Table IV

Components of a Benefit-Cost Calculation
of a Manpower Training Program (Benefits)

Society	Individual	Government
1. Increase in earnings of program participants (gross of taxes)	1. Increase in earnings (net of taxes)	1. Increase in taxes a. From participants b. From others
2. Increases in other income (gross of taxes) a. To pay for fringe benefits b. Due to other resources becoming more productive c. Due to increasing the productivity of future generations as children become better educated (inter-generation effect) d. Due to previously unemployed workers taking jobs vacated by program participants (vacuum effect)	2. Additional fringe benefits due to increased income	2. Decrease in expenses of a. Unemployment insurance b. Employment service c. Welfare programs d. Crime control
3. Reduction in administrative expenses of transfer payment programs a. Unemployment administration b. Employment service operation c. Welfare program administration		
4. Reduced costs to society due to bad citizenship a. Economic loss to others b. Crime control system		

Table V

Components of a Benefit-Cost Calculation
of a Manpower Training Program (Costs)

1. Opportunity costs (gross of taxes)	1. Opportunity costs (net of taxes)	1. Costs of instruction and supplies (net of taxes)
2. Operating costs of training or education agency	2. Loss of transfer payments a. Welfare support b. Unemployment insurance c. Other subsidies	2. Capital costs
3. Capital expenses of training or education agency	3. Extra costs related to program participation a. Tuition b. Books, supplies, etc.	3. Additional administrative costs (net of taxes)
4. Induced reductions in income (gross of taxes) of workers displaced by program participants (displacement effect)		4. Additional subsidies paid during training

an institution's accounting department. The cost accountants, using standard accounting procedures, will then sub-divide the various costs of a program and relate these costs to the participants. Added to these institutional cost components, which most adult educators are aware of, will be the participant's opportunity costs, that is, what a person may have lost in income if he had a job or if he could have acquired a job rather than taking the manpower training program. This, of course, may not apply to hard core unemployables. Other costs to the individual would be the loss of any unemployment insurance benefits, welfare payments, etc. that may have to be relinquished while attending the program.

As in the case with benefits, only those costs which are clearly definable and related to the institution and participant should be considered. Other costs may be included but only as by-products, unless data is available.

In conclusion, the program planner or administrator, except where other data prevails, normally only concerns himself with the program benefits and costs as they directly affect the sponsoring institution and program participants. He will then be able to acquire most of his cost and benefit data at comparatively little cost (money and time) and will be able to defend the financially measured program components. Where figures are not available but external costs and/or benefits want to be included in a report, the planner should make reference to valid research in related areas.

(2) How will the costs and benefits be valuated?

"The essential principle is that all prices must be reckoned on the same basis, and for convenience this will normally be the price-level

prevailing in the initial year".[6] Therefore, when cost and benefit components are compared, the comparison must be made at a given time. Since in most cases the costs and benefits accrue over a period of years, they must be discounted in order to take into account the time factor. There are three common methods of comparing costs and benefits: (i) present value of net benefits; (ii) rate of return, and; (iii) benefit-cost ratio.

As pointed out in Table VI below,[6a] the present value of net benefits is calculated by discounting the stream of future benefits back to the present (usually defined as the time a person or group finishes a program), and subtracting accumulated costs from this total (including any interest) calculated at the same time. This will tell us the

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Table VI

The Three Methods of Comparing Benefits and Costs

Type of Comparison	Method of Calculation[a]	Decision Rule
1. Present Value of	1. $\sum_{t=0}^{n} \frac{B_t - C_t}{(1+i)^t}$	1. Select the project with the highest net benefits first, then pursue successive projects in descending order of net benefits.
2. Rate of Return	2. $\sum_{t=0}^{n} \frac{B_t - C_t}{(1+r)^t} = 0$	2. Select the project with the highest rate of return (r), then pursue successive projects in descending order of r until r equals some predetermined interest rate (i).
3. Benefit-Cost Ratio	3. $\frac{\sum_{t=0}^{n} \frac{B_t}{(1+i)^t}}{\sum_{t=0}^{n} \frac{C_t}{(1+i)^t}}$	3. Select the project with the highest B/C, then pursue projects in descending order until B/C=1 or budget exhausted.

where B_t = benefits in year t

C_t = costs in year t

n = number of years spanned by the analysis

i = social discount rate

r = rate of return

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absolute size of gain due to the program. Rate of return is calculated by finding the interest rate that will equalize the present value of costs and benefits. This tells us the rate of interest the investment in the program is earning. The benefit-cost ratio is calculated by dividing present value of benefits by present value of costs. This tells us how large the gain is relative to the size of the investment. The benefit-cost ratio differs from the present value of net benefits because the latter tells us the absolute size of the gain.

Since the concept of present value is used in all three calculations it would be best at this time to explain this facet of cost-benefit analysis.

Table VII, Present Value of One Period,[7] shows what $1.00 payable periodically in the future is worth today. This table also assumes that the payments will be received at the end of each period; it is, therefore, a table for the present value of an ordinary annuity. The vertical axis lists the years (1 to 50) and the horizontal axis lists the potential interest rates (1/2% to 24%).

Pictorially, the present value of an annuity of four $1.00 payments, with interest compounded annually at 5% would be $3.55. (3.5460 in Table VII). This may be seen in Figure III below.[8]

All these forms of benefit and cost determination are not only equally suitable (depending on the situation), but they have been used in real situations and have all been equally criticized. The criticism has not been leveled at the logic of CBA, but rather at the choice of an interest rate (i) for discounting costs and benefits. Due to market imperfections caused by a monopolistic competitive structure where there are so few competitors that they can control the market for funds available

Table VII

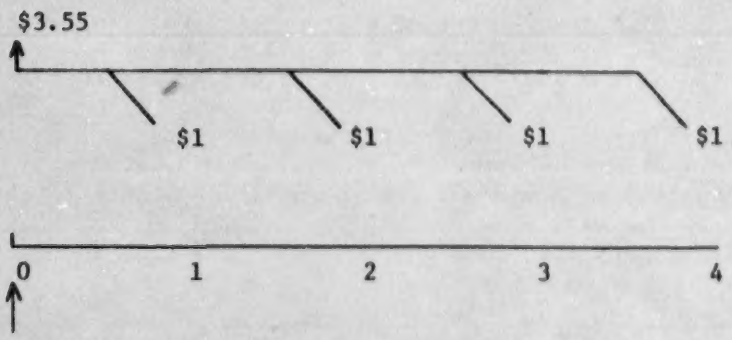
Present Value of 1 Per Period

$$A\bar{a}i = \frac{1 - (1 + i)^{-n}}{i}$$

n	1/2%	1%	2%	4%	5%	6%	8%	10%	16%	24%
1	0.9950	0.9901	0.9804	0.9615	0.9524	0.9434	0.9259	0.9091	0.8621	0.8065
2	1.9851	1.9704	1.9416	1.8861	1.8594	1.8334	1.7833	1.7355	1.6552	1.4568
3	2.9702	2.9410	2.8839	2.7751	2.7232	2.6730	2.5771	2.4869	2.2459	1.9813
4	3.9505	3.9020	3.8077	3.6299	3.5460	3.4651	3.3121	3.1699	2.7981	2.4043
5	4.9259	4.8534	4.7135	4.4518	4.3295	4.2124	3.9927	3.7908	3.2743	2.7454
6	5.8964	5.7955	5.6014	5.2421	5.0757	4.9173	4.6229	4.3553	3.6846	3.0205
7	6.8621	6.7282	6.4720	6.0021	5.7864	5.5824	5.2064	4.8684	4.0386	3.2423
8	7.8230	7.6517	7.3255	6.7327	6.4632	6.2098	5.7466	5.3349	4.3436	3.4212
9	8.7791	8.5660	8.1622	7.4353	7.1078	6.8017	6.2469	5.7590	4.6065	3.5655
10	9.7304	9.4713	8.9826	8.1109	7.7217	7.3601	6.7101	6.1446	4.8333	3.6819
11	10.6770	10.3676	9.7868	8.7605	8.3064	7.8869	7.1390	6.4951	5.0286	3.7757
12	11.6189	11.2551	10.5753	9.3851	8.8633	8.3838	7.5361	6.8137	5.1971	3.8514
13	12.5562	12.1337	11.3484	9.9856	9.3936	8.8527	7.9038	7.1034	5.3423	3.9124
14	13.4887	13.0037	12.1062	10.5631	9.8986	9.2950	8.2442	7.3667	5.4675	3.9616
15	14.4166	13.8651	12.8493	11.1184	10.3797	9.7122	8.5595	7.6061	5.5755	4.0013
16	15.3399	14.7179	13.5777	11.6523	10.8378	10.1059	8.8514	7.8237	5.6685	4.0333
17	16.2586	15.5623	14.2919	12.1657	11.2741	10.4773	9.1216	8.0216	5.7487	4.0591
18	17.1728	16.3983	14.9920	12.6593	11.6896	10.8276	9.3719	8.2014	5.8178	4.0799
19	18.0824	17.2260	15.6785	13.1339	12.0853	11.1581	9.6036	8.3649	5.8774	4.0967
20	18.9874	18.0456	16.3514	13.5903	12.4622	11.4699	9.8181	8.5136	5.9288	4.1103
21	19.8880	18.8570	17.0112	14.0292	12.8212	11.7641	10.0168	8.6487	5.9731	4.1212
22	20.7841	19.6604	17.6580	14.4511	13.1630	12.0416	10.2007	8.7715	6.0113	4.1300
23	21.6757	20.4558	18.2922	14.8568	13.4886	12.3034	10.3711	8.8832	6.0443	4.1371
24	22.5629	21.2434	18.9139	15.2470	13.7986	12.5504	10.5288	8.9847	6.0726	4.1428
25	23.4456	22.0232	19.5235	15.6221	14.0939	12.7834	10.6748	9.0770	6.0971	4.1474
30	27.7941	25.8077	22.3965	17.2920	15.3725	13.7648	11.2578	9.4269	6.1772	4.1601
35	32.0354	29.4086	24.9986	18.6646	16.3742	14.4982	11.6546	9.6442	6.2153	4.1644
40	36.1722	32.8347	27.3555	19.7928	17.1591	15.0463	11.9246	9.7791	6.2335	4.1659
45	40.2072	36.0945	29.4902	20.7200	17.7741	15.4558	12.1084	9.8628	6.2421	4.1664
50	44.1428	39.1961	31.4236	21.4822	18.2559	15.7619	12.2335	9.9148	6.2463	4.1666

Figure III

Present Value of an Annuity of Four $1.00 Payments. Interest Compounded Annually at 5%



for borrowing (government's ability to borrow at below market interest rates), investment decisions may not be appropriate and failure to correct for these distortions is likely to lead to misallocation of investment projects. As indicated by Table VII, if the government can borrow funds at 5% rather than the market interest rate of 8%, over a period of 20 years it has added considerably to the value or benefit of its project (12.4622 vs. 9.8181). But is this a true reflection of the project's benefit? By using the going market interest rate which assumes a more competitively based determinant, would not another alternative be acceptable?

The internal rate of return (r) has come into prominence partly because it eliminates investment decision-making's crucial dependence on the interest rates used to discount the costs and benefits. Since it gives us the rate of return for a group of alternative investment proposals, the only program decision rule to follow is to choose the program with the highest internal rate of return (r).

The above form of calculating a program's costs and benefits has also been criticized on the grounds that there may be more than one value of (r) that will satisfy the equation. In other words, occasions appear when an investment has more than one internal rate of return.

In summary, one may conclude that although all three investment decision criteria are used, all three have their own specific imperfections. "In most cases, the choice of method is one of convenience, and all three methods will yield identical or closely similar project rankings".[10] As far as determination of the internal rate of return is concerned it becomes an iterative process; as far as determining the interest rate for the present value of discounted benefits and costs one may consult recent

literature covering projects related to those under discussion or discuss the matter with public finance experts. To quote Prest and Twrvey, "No one has been able to unscramble an omelette".[11]

(3) What are some of the limitations related to CBA?

Although the prior discussions of interest rate and cost-benefit determination appear to present a rather straight forward method of operation for the adult educator, there are certain limitations or constraints that one should be aware of before embarking on CBA usage. These limitations are divided into two parts: those dealing with costs and those dealing with benefits and interest rate.

There are four basic problems one encounters when evaluating costs:

(i) The first, and most obvious problem in determining the cost of some adult education activity is lack of adequate cost accounting data. For some unknown reason, all levels of government, especially where education is concerned, have been slow to adopt comprehensive accounting principles and practices that permit cost calculation for specific activities within any defined agency or department. The result of this non-PPBS approach to activity determination is a dependence by program planners on educated guesses concerning program costs.

This introduces a more subtle problem--the use of average rather than marginal costs. This occurs because average costs can be calculated with less detail than marginal costs. Marginal costs, however, should be used because they tell one how much the total costs of some activity will change when there is a change in the level of activity by some small amount. Average costs can be used only to "look in the mirror to see where we have been"[12] and to help us decide whether we should have been there in the

first place. Average cost data cannot tell one whether he should recommend expanding, holding constant, or decreasing the level of an adult education program.

(ii) The second problem relates to joint costs, that is, when a given expenditure serves more than one activity either simultaneously or in sequence. This is a common occurrence when use of a capital facility (building) or an administrative service (janitorial) is involved. The problem is two-fold: (a) to recognize the occurrence; (b) to decide what portions of the joint costs to allocate to various activities. Although "there is no 'right' way to do this",[13] one must still rely on good judgement when determining joint cost components, and, accurate cost accounting data.

(iii) The third problem faced by CBA analysts is determining program participant opportunity costs, that is, what must they give up in order to attend an educational activity. In the case of manpower training programs, the opportunity costs generally consist of earnings that the participants may forego. The earnings may consist of transfer payments from government agencies such as welfare benefits or unemployment insurance benefits, or salaries from a regular job. Where opportunity costs may not be considered a factor, such as in a normal night school situation, then they are not used in the cost calculations.

(iv) The fourth problem related to cost estimation is defined as price distortions. Such distortions emerge because of the price advantage held by government units in purchasing material and non-payment of sales and property taxes. Economists disagree over whether a price adjustment should be made, although normal practice is not to make such an adjustment.

There are four basic problems one encounters when evaluating benefits:

(i) The first problem is finding an appropriate control group. Although program evaluators or program planners have used one or more separate control groups in order to isolate a program's effect on its participants, there is a lack of agreement over what determines an adequate control group. This has resulted in the use of different control groups in different studies. The latter aspect leads to a great deal of difficulty when one attempts to compare related CBA studies.[14]

(ii) The second problem, as in estimating costs, concerns a lack of data for estimating benefits. This was discussed previously when one realized that benefits go beyond the program participant and into other government agencies or the society in general. Although these so-called externalities are usually ignored, their inclusion should be considered. The lack of direct cost accounting data also forces the analyst to depend on average rather than marginal data.

In addition to the potentially measurable economic benefits discussed above, a significant group of benefits may exist that do not generally lend themselves to quantification but should, where possible, be included in any adult education planning project. These "non economic" benefits are:

> "Consumption value of the training and education (many people enjoy the training and education process itself, and thus derive benefits simply from participation.); (2) benefits society may receive from its citizens participating more in public affairs (assuming that those with more education and income do more of those things included under 'good citizenship'); (3) the individual's satisfaction in being successful in his chosen vocation; (4) value of options to the trainee for further education and training made possible by participating in any one program; and (5) value of redistributing income in a more 'equitable' manner."[15]

(iii) The third problem relates to the choice of discount rates for the present value determination. If the discount rate is too small then the benefits will be overestimated; if the rate is too high the opposite will occur. "Unfortunately, little agreement exists over how the discount rate should be selected, let alone what the resulting 'correct' rate is".[16] The U.S. Army Corps of Engineers has used a rate as low as 3-1/4% for flood control procedures,[17] however, studies in the area of adult education normally utilize discount rates between 5 and 15%,[18] with emphasis on the 8 to 12% levels.[19]

As far as economists are concerned, the problem "is partly a matter of different interest theories and partly a matter of how particular economics tick at particular times---do governments intervene in capital markets with any effectiveness, how well organized and unified is the capital market in a country, etc.?".[20]

If the adult educator follows the general norm presently being used, one would have to say that a 10% discount rate would, in most respects, be acceptable; although this rather high rate would, along with the non-measurable benefits, be a somewhat conservative figure and may underestimate benefits.

(iv) The fourth problem, which is closely related to the discount rate consideration, is the selection of a time horizon. It is not the specific number of years that may cause the problem, it is the underlying assumptions. When a time horizon is longer than two years benefits must be estimated by some method of extrapolation, therefore one assumes: (a) using a cross-section analysis is a satisfactory prediction of future benefits; (b) the income of the participants will remain relatively constant throughout the remainder of the working life; (c) the income of

the participants would have to remain constant if they had not become part of an education program, and; (d) all of those who found jobs would remain employed throughout the remainder of the period used in discounting the benefits.

SUMMARY

> "The various ways in which the extrapolations have been made reflect differences in approach to handling uncertainty. Uncertainty arises because we do not know the actual path of benefits, and have no good way of predicting what events might occur to affect those paths. Industrial composition might change and bring a change in demand for skills. Dramatic technological breakthroughs might eliminate the need for some skill almost overnight. Institutional arrangements might change and affect earnings. These possibilities cannot be predicted."[21]

As with any form of rationale used for the development and evaluation of an adult education program, CBA is one additional technique. Its present popularity is derived from two basic sources: (1) the funding organizations have observed economic output from other non-educational public agencies such as the U.S. Army Corps of Engineers, and have observed how these agencies find it relatively easy to influence funds toward their agency needs; (2) on the other hand, economic analysis has an output which most everyone can understand---the dollar and cents value of an educational project. The sociologist, psychologist and educator usually have a difficult time presenting their rationale to public (or private) administrators who must take responsibility for funding projects. The social scientist, in reality, speaks a non-understandable social science language; and the output of a particular adult education program couched in such terminology, when compared with a monetary output, becomes second best to a third-party

decision-maker.

In conclusion, one can assume that CBA as an alternative form of project rationale is quickly becoming equal to other social science rationales. An example of CBA's use in adult education will follow. The presentation will be made using a simplified example drawn from a retraining program presented under the U.S. Manpower Development Act.[22]

FOOTNOTES

1. A.P. Prest and R. Twrvey, "Cost-Benefit Analysis: A Survey," The Economic Journal, #300, Vol. 75, December, 1965, p. 683.

2. Ibid., p. 685.

3. W. Hettich, Why Distribution Is Important: An Examination of Equity and Efficiency Criteria in Benefit-Cost Analysis (Information Canada; Ottawa: 1971), pp. 5-8.

4. Prest and Twrvey, op. cit., p. 686.

5. Bruce F. Davie, "Benefit/Cost Analysis of Vocational Education: A Survey," in S.L. Barsby, Cost-Benefit Analysis And Manpower Programs (D.C. Heath & Co.; Toronto: 1972), pp. 9, 10.

6. Prest and Twrvey, op. cit., p. 690.

7. D.A. Corbin, Accounting and Economic Decisions (Dodd, Mead and Company; Toronto: 1964), p. 677.

8. Ibid., p. 675.

9. Ibid., p. 675.

10. Hettich, op. cit., p. 4.

11. Prest and Twrvey, op. cit., p. 700.

12. Barsby, op. cit., p. 14.

13. Ibid., p. 4.

14. Ibid., p. 19.

15. Ibid., p. 20.

16. Ibid., p. 20.

17. Prest and Twrvey, op. cit., p. 684.

18. Barsby, op. cit., p. 20.

19. E. Hardin and M.E. Borus, The Economic Benefits of Retraining (D.C. Heath and Company; Lexington, Mass.: 1971).

20. Prest and Twrvey, op. cit., p. 697.

21. Barsby, op. cit., p. 21.

Footnotes

22. This example is drawn from D.A. Page, "Retraining Under The Manpower Development Act: A Cost-Benefit Analysis," in J.D. Montgomery and A. Smithies, editors, Public Policy, Vol. 13 (1964) pp. 257-67, and discussed in D.C. Rogers and H.S. Ruchlin Economics and Education: Principles and Practices (The Free Press, N.Y.: 1971), pp. 198-206.

CHAPTER IV

A COST-BENEFIT ANALYSIS EXAMPLE

INTRODUCTION

In order to aid program coordinators concerned with the U.S. Manpower Development Act and its implementation, it proved useful to examine the costs incurred and benefits derived from retraining 907 men and women. Using economic efficiency as the prime objective, the net benefits and costs accruing to the agency and participants were measured.

THE CBA PROCEDURE

The presentation of the methodology and data will follow four steps.

(1) Determination of Gross Benefits and Costs to the Program

Since all costs may be expected to accrue during the training period, there is no need to reduce them to present value, and the total cost equation may be written as:

$$C_t = C_e + C_m + C_k + C_s$$

where:

C_t = total costs

C_e = educational costs

C_m = subsistence costs

C_k = capital costs

C_s = supervision

Using the costs incurred in this case, total costs of retraining may be computed for the group. Gross benefits to be derived from retraining in terms of the efficiency objective may be measured as the change in individual income streams.

Table VIII

Costs of Retraining

Tuition	$ 567.10 (average)
Subsistence during Retraining	143,000.00 (total)
1959 Employment Compensation	24,000.00
Net Subsistence during Retraining	119,000.00
Supervisory	a
Travel	b
Number Trained	907

$$C_t = C_e + C_m + C_k + C_s$$
$$= 907(\$567.10) + \$119,000 + 0 + 0$$
$$= \$633,359.00$$

[a]Supervisory expenses were of course not zero but the program was administered through regular machinery and no estimates were available.

[b]Travel allowances were negligible in this case study

Denoting b_i as the benefit of the i^{th} individual, y_1 as the income of the i^{th} individual with retraining, and y_o as the income of the i^{th} individual without retraining, we may write:

$$\triangle \quad b_i = y_1 - y_o$$

and summing over the group of all retrainees, one obtains

$$\sum_{i=1}^{M} \Delta b_i = \sum_{i=1}^{M} (y_1 - y_o)$$

Since the average group income with and without retraining will be used rather than individual gains (or losses), the benefit equation may be rewritten as

$$B = N(y_1 - y_o)$$

where B is the total benefit for the group, and N is the number of retrainees. Or, for the sake of simplicity:

$$B = Y_1 - Y_o$$

where the Y's denote total group income with and without retraining.

In this regard, three refinements must be made. First, an individual's income with and without retraining may include transfer payments from unemployment compensation (U.S.) and welfare. Since only earned income may be taken as a measure of productivity, transfer payments should be deducted from total income to determine net gains to an efficiency criteria. Denoting total income with and without retraining as Y_{t_1} and Y_{t_o} and total transfer payments with and without retraining as Y_{p_1} and Y_{p_o} the benefit equation may be written as:

$$B = (Y_{t_1} - Y_{p_1}) - (Y_{t_o} - Y_{p_o})$$

And, using the statistical summaries of the information supplied by the trainees, the gross benefits may be calculated. (See Table IX.)

Costs of the program were conveniently divided into four classifications: costs of education, costs of subsistence allowances including transportation during retraining, costs of supervision and capital costs.

Costs of education or "tuition" included such items as rental on equipment, facilities and instruction. Subsistence costs represent a

Table IX

Gross Benefits to Retraining

Gross Benefits to Retraining

Gross Benefits	
Total income with retraining	$ 3,823 (average)
Total income without retraining	2,847
Increase	976
Per cent increase	34.2%
Transfer payments without retraining	24,000 (total)
Transfer payments with retraining	8,000
Decrease	16,000
Per cent decrease	66.7%
Number of trainees who found jobs using training skills	438

$$B = (Y_{t_1} - Y_{p_1}) - (Y_{t_o} - Y_{p_o})$$

$$B = [(3823)(438) - 8000] - [(2847)(438) - 24,000]$$

$$= 443,488$$

somewhat more complex problem:

> "The MDA provides for subsistence allowances for trainees and their families totaling not more than the amount qualified for under the respective state unemployment compensation allowances. Moreover, these allowances are provided only if funds are not available through unemployment compensation. Therefore, only the differential amount should be charged to the retraining program, since presumably this cost would be incurred regardless of the existence of a training program. In the Massachusetts case, subsistence chargeable to retraining amounted to approximately 83 per cent of total subsistence during the training period. The Act provides for subsistence for a period not to exceed 52 weeks. Anyone undergoing training in excess of one year would be forced to procure funds from some other sources."[1]

Supervisory costs were not zero, but the program was administered through regular machinery and no estimates were available.

As far as the capital costs are concerned, these:

> "Capital costs for retraining under the MDA will tend to be negligible since the Act requires the Secretary of Health, Education and Welfare to provide training facilities through agreements with the states and states' vocational agencies. The states are in turn to provide for such training through existing public education agencies or institutions. If state facilities are inadequate or inappropriate to this purpose arrangements may be made with private educational and training organizations. Funds are, at the present time, intended only to make minor repairs deemed necessary for adequate training. In the Massachusetts case no capital costs were incurred that were attributable to the training program."[2]

(2) Determination of Non-educational Variables Affecting Income

> "Allowances must be made for cyclical changes in the economy. If improvement in income should be attributed to improvements in the overall economy, as for example, between a pre-war and war-time economy, benefits cannot be reasonably be attributed solely to retraining. Similarly, if there has been a downturn in the economy this too must be taken into account in evaluating benefits to retraining. To do so we will let ϕ represent the per cent of income attributable to retraining after allowing for changes in the economy. To determine ϕ, the net change in income during the training period of a control group was measured. The group was comprised of a random sample of individuals in the Central Claims File of the

Bureau of Employment security having six characteristics similar to those of the trainees.

There are two significant factors to be considered in determining the ϕ factor for the benefit equation: (1) the change in income of the control group, and (2) the nature of the increase, whether earned or transfer payments. Denoting Y_{ct_1} and Y_{cp_o} as the change in total income with Y_{cp_1} and Y_{cp_o} as the change in transfer payments of the control group during the training period, the general economy factor expressed as a per cent may be written as:"[3]

Table X

Control Group Experiences

$$= 100 - 100\left[\frac{(Y_{ct_1} - Y_{cp_1}) - (Y_{ct_o} - Y_{cp_o})}{Y_{ct_o} - Y_{cp_o}}\right]$$

and the benefit equation now reads

$$B = \phi[(Y_{t_1} - Y_{p_1}) - (Y_{t_o} - Y_{p_o})]$$

Therefore:

Total income after the training period	$ 3,854 (average)
Total income before the training period	3,489 (average)
Transfer payments after the training period	26,000 (total)
Transfer payments before the training period	20,000 (total)
Number in Control Group	104

$$\phi = 100 - 100\left[\frac{(Y_{ct_1} - Y_{cp_1}) - (Y_{ct_o} - Y_{cp_o})}{Y_{ct_1} - Y_{cp_o}}\right]$$

$$= 100 - 100\left\{\frac{[104(3,854) - 26,000] - [104(3,489) - 20,000]}{104(3,489) - 20,000}\right\}$$

$$= 100 - 100\left\{\frac{30,000}{344,000}\right\}$$

$$= 100 - 8.7$$

$$\phi = 91.3$$

(3) Determining Present Value of the Benefits Less the Costs

"Gross benefits accruing in future time periods must be reduced to present value to be compared with costs occurring at present. To do so a time period must be selected which reflects the remaining working life of the trainee. In the case study the average age of the trainees was 30 years. It is assumed that they would be eligible for retirement at the age of 65, and that therefore the average remaining working life (time period for the present value factor) would be 35 years.

More difficult is the problem of choosing the interest rate to be used in discounting future benefits. The tendency here should be to select a reasonably high rate of interest since, in such cases, one is concerned more with immediate payoff rather than long-term benefits accruing to future generations. Furthermore, as an employee increases in age, the greater likelihood that: (1) he will be eligible for early retirement, and (2) he will have fewer financial responsibilities. In evaluating the case study future benefits were discounted at a rate of 10 per cent."[4]

Table XI

Present Value Factor

Average Working Life of Trainees	65 years
Average Age of Trainees	30 years
Time Period for Present Value Factor	35 years
Rate of Interest to Discount Future Income to Present Value	10%
Present Value Factor (See Table IV)	9.644

"Other benefits to efficiency would be the difference between consumption of public goods and services and the amounts paid in taxes for goods and services with and without retraining. These benefits, although important, will not be considered here because of the difficulty of measuring them, but they do exist and should be kept in mind."[5]

Net benefits resulting from retraining may then be written as:

$$N = PV(B) - C$$

Using the gross benefit and total cost calculations from Tables VII-XI, the net benefits occurring as a result of retraining in this

instance amount to approximately $3,266,641, as depicted in Table XII:

Table XII

Net Benefits of Manpower Training Program

$$N = PV(B) - C$$

$$= 9.644(91.3)\ (443,488) - 633,359$$

$$= 3,900,000 - 633,359$$

$$= \$3,266,641$$

(4) The Major Assumptions

The major assumptions are based on the previous discussions and speak for themselves:

(i) Income of the retrainees remains relatively constant throughout the remainder of their working life;

(ii) It is assumed that without retraining the incomes of the trainees would have, on the average, remained constant;

(iii) It is assumed that all of those who found jobs would remain employed throughout the remainder of the period used in discounting gross benefits;

(iv) There is no displacement of workers as a result of retraining;

(v) Administrative costs were negligible.

SUMMARY

The following explanation of CBA should make the reader aware that this method of program planning or evaluation cannot be used without

reference to the administrative framework conceived for and conducive to its application. It is the educationalist working within the institutional structure who determines the boundaries of CBA through the Planning, Programming, Budgeting System's process. The various political, legal, educational, budget, community, etc. constraints allow CBA to work in a macro or aggregate framework covering many institutions, as well as in a decision-making atmosphere where the adult education objectives have been pre-stated.

FOOTNOTES

1. Rogers and Ruchlin, op. cit., p. 200.
2. Ibid., p. 200.
3. Ibid., p. 203.
4. Ibid., p. 204.
5. Ibid., p. 204.

CHAPTER V

SUMMARY

Accountability has been defined as a process designed to ensure that any individual can determine for himself if the particular educational institution is producing the promised results.

In order for accountability to become operationalized in an institution it has been suggested that an acceptable and workable management system for decision-making and expenditure allocation be adopted. This so-called system has been referred to as the Planning, Programming and Budgeting System.

Planning, Programming and Budgeting System involves the selection of long-range educational objectives, decisions on specific course of action to be followed, and translation of planning and programming decisions into specific financial plans for relatively short time periods.

An overview of the demand for Planning, Programming and Budgeting System was presented as a rationale for its increasing acceptance, and a ten-step procedure developed for generalized use in any educational institution. Within this ten-step procedure, cost-benefit analysis was introduced as one of the many possible program evaluation techniques.

Cost-benefit analysis has traditionally emphasized economic efficiency as the main criterion for judging and ranking educational program proposals. However, as mentioned previously, this evaluation

technique is only one of many possible ways of judging a program's worth, and must be used in coordination with more traditional evaluation techniques based in sociology, psychology, etc.

An example of cost-benefit analysis, using a manpower training program, was presented to allow the reader to understand the scope and limitations of the technique.

Adoption of the accountability concept with an economic reality superimposed through both an administrative decision-system (PPBS) and evaluation technique (CBA) appears to be a hard fact of educational progress. As this adoption process takes place in specific adult education institutions it will be most important for all administrators and program planners to understand the total process and use it to their greatest possible advantage.

It has therefore been this author's objective to present a somewhat detailed overview of an emerging decision-system so that concerned adult educators begin to develop a comprehensive understanding relative to their own needs.

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